

REMARKS

The outstanding Office Action includes a rejection of claims 17 under 35 U.S.C. §101. In view of the cancellation of claim 17, withdrawal of this rejection is requested.

The Office Action include a rejection of claims 1-4, 6-8, 10-12, and 14-17 under 35 U.S.C. §112, second paragraph. In view of the amendment to the claims, withdrawal of this rejection is requested.

The Office Action include a rejection of claims 1-17 under 35 U.S.C. §103(a) over German Patent 3819020 (DE '020), U.S. Patent No. 5,833,830 to Gonzalez Dominguez et al., U.S. Patent No. 4,917,775 to Rantapuska et al., the Examiner's reference "admitted prior art," and U.S. Patent No. 6,606,901 to Haanstra et al. This rejection is traversed.

The claimed invention is based on a method and an apparatus for controlling a continuous cobalt removal in conjunction with a zinc preparation process, in which the cobalt removal is performed in one or more reactors, in conjunction with the one or more reactors, the redox potential and the acidity and/or basicity are measured, and the process variables of the cobalt removal are adjusted toward a the desired direction based on the measurement results, wherein the measurements of the redox potential are performed from the sludge produced in the reactor outside the reactor vessel, and the acidity and/or basicity of the reactor solution is determined by means of the BT value, and the measuring instrument of the redox potential is purified at predetermined intervals, and based on the measurement results introduction of zinc powder into the cobalt removal reactor is adjusted.

The present method and apparatus differ clearly from the prior art. Furthermore, the method and the apparatus would not have been obvious for a person skilled in the art based on the prior art.

Rantapuska et al. disclose a method for measuring electrochemical potential by at least one mineral electrode. The mineral electrode is cleaned by switching onto the electrode a supply voltage differing from the electrochemical balance potential of the electrode. Supply voltage is switched off before starting the measuring operation. In the description of Rantapuska et al. it is not disclosed that the measuring of the electrochemical potential and/or the cleaning of the electrode is carried out outside the reactor vessel or that the electrode has been arranged

substantially outside reactor vessel. In figure 2 of Rantapuska et al., there is illustrated only a measuring cell 12, because it is easier and clearer to illustrate the measuring cell separately without a reactor than in connection with the reactor. In fact the measuring cell has been arranged in the reactor vessel. In figure 3 of Rantapuska et al., there is illustrated only processing of the data received by the measuring cell.

Gonzalez Dominguez et al. disclose a method of electrowinning a metal from an electrolyte comprising the steps of measuring the redox potential of the electrolyte to obtain a measured value, comparing the measured value with a predetermined optimum value and adding a redox agent (e.g. hydrogen peroxide) to the electrolyte to adjust the redox potential of the electrolyte to the optimum value. The electrolyte has predetermined the redox potential optimum zone wherein the amount of undesired chemical products, such as manganese dioxide, is controlled by neutralize or reducing the electrolyte solution. The redox potential is measured from the electrolyte (non-rich solution relating to metal) removed from the electrolysis. The measurement results are introduced into the feeding system into which is introduced fresh electrolyte supplied in the electrolysis, a part of the electrolyte removed from the electrolysis and the redox agent. The method of Gonzalez Dominguez et al. is used clearly in different embodiments than the present invention. In the method of Gonzalez Dominguez et al. it is tried to prevent the forming of the manganese compounds by means of the indirect adjustment.

DE '020 discloses a method for adjusting the amount of zinc powder to be used in the removal of impurities from zinc sulphate solution. Haanstra et al. disclose a process for determining the acidity of a washing solution for removing adhering acid or base from a fibre. DE '020 and Haanstra et al. can be considered only as the general state of the art.

In the present invention, the measuring instrument of the redox potential is arranged outside the reactor vessel.

In the present invention, the use of the BT (Back titration) value for determining the acidity and/or basicity of the reactor solution was completely new technology at the time the invention was made. The use of the BT value would not have been obvious to a person skilled in the art at the time the invention was made.

It is known that metallic zinc powder is introduced into a solution in a solution

purification process of zinc sulphate solution for improving the separation of the desired metal. The mentioned solution has a certain buffer capacity. The buffer capacity means that pH of the solution remains unchanged if a small quantity of zinc powder is added into the solution. Then there is a problem that it is possible to introduce too much zinc powder in the reactor solution if the acidity and/or basicity of the reactor solution is determined by means of the pH value.

In the present invention the acidity and/or basicity of the reactor solution is determined by means of the BT value. Due to the BT value, the real acidity and/or basicity of the solution is known. The BT value describes the status of a process more accurately than the pH value, and the BT value enables one to perform accurate determinations to evaluate the status of the process. The acidity and/or basicity of the solution can be adjusted more accurately toward the desired direction.

Furthermore, in the present invention, the introduction of zinc powder into the metal removal reactor is adjusted based on the measurement results.

In view of the above comments, the claimed invention would not have been obvious over the DE '020, Gonzalez Dominguez et al., Rantapuska et al., the Examiner's reference to "admitted prior art," and Haanstra et al. Accordingly, withdrawal of this rejection is requested.


It is believed that this application is in condition for allowance. Early notice to this effect is earnestly solicited.

Respectfully submitted,



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